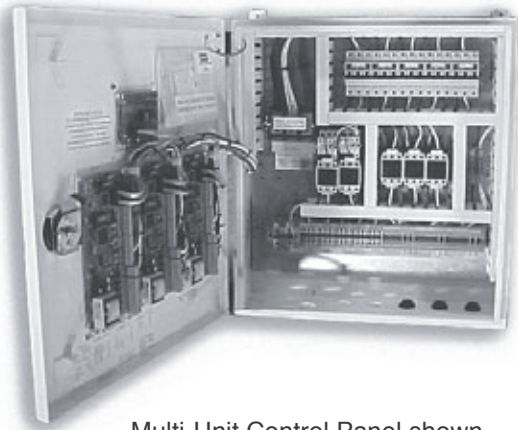


PRODUCT DESCRIPTION

The Tempered Water Logic Control (TWLC) is an advanced microprocessor chiller control specifically designed for marine circulated water systems. The TWLC system maximizes system performance, protects the chillers with advanced fault protection monitoring and shut-down routines, and has easy menu-driven operation supplying the user with important system information.



Multi-Unit Control Panel shown

System redundancy and easy field repair were the priorities when the TWLC was developed. Each chiller in a TWLC system has a dedicated power/logic board, and the boards are networked together to form an integrated system (automatically controlling up to 6 chillers). This design means that a single board or network failure will not shut down the entire system. The P/L board has board-mounted LEDs to help with troubleshooting, replaceable EPROM for software upgrades, and plug-in terminal strips and RJ-12 jacks which allow for quick field installation.

Interaction with the system is through the TWLC keypad/display. A simple 4-button keypad is used to change operation mode and to navigate through the menus to view and change system parameters. A backlit LCD display supplies easy to read information about the system, including water temperatures, operation mode, which chillers are running, and other detailed information. Three small LEDs on the keypad clearly indicate Cool or Heat modes, and faults. An alarm buzzer on the keypad can also signal a fault. Additional TWLC keypads can be installed to allow remote system access.

Set up and operation of the TWLC is fully automatic. It senses how many units are connected and programs the temperature staging and unit rotation of the units to pre-programmed parameters. The TWLC board has non-volatile memory so settings and recorded information are not lost even if power is interrupted. The large memory capacity allows the TWLC to record run time of the compressors and pumps, and store the fault history of each unit.

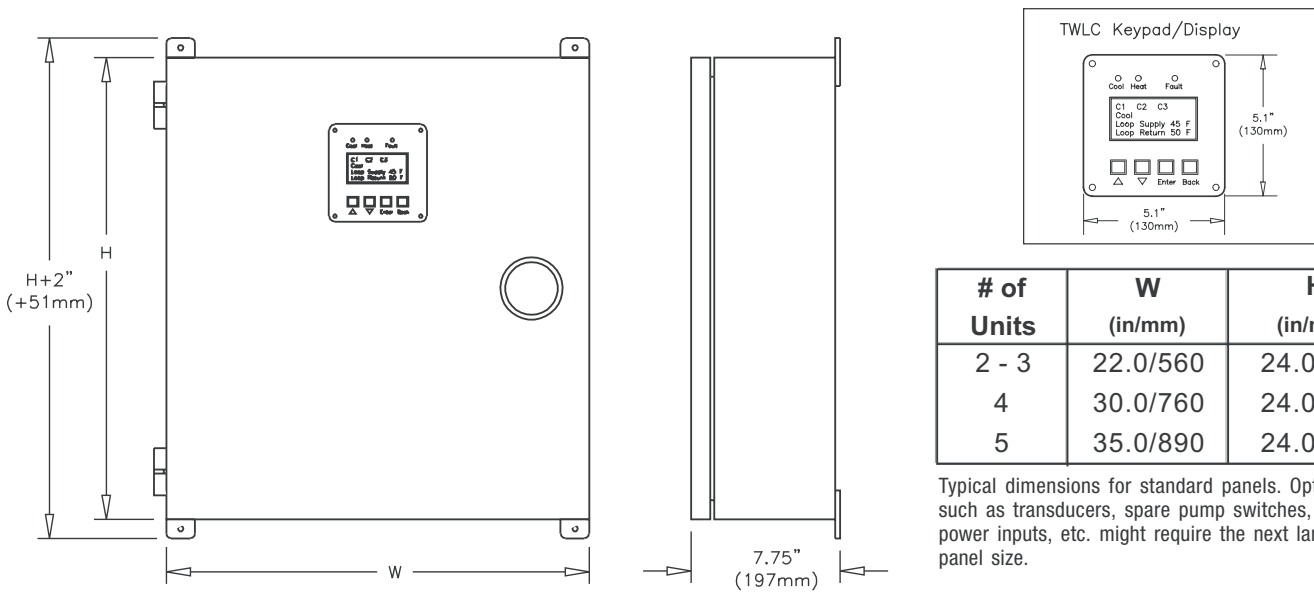
The system monitors all the inputs and will display 12 different faults based on the information received. Each fault has a specific routine that protects the unit while helping to prevent nuisance faults. Some will generate a sustained shutdown, which must be reset from the TWLC keypad.

If a fault is sensed, the fault LED on the TWLC keypad will light (and the buzzer will sound, if activated) and the specific fault will be displayed on the LCD screen. The fault signal output on the P/L boards will also be powered.

Another feature of the TWLC is that it can be connected to an on-board computer or modem to allow full remote access of the system. Custom software emulates the TWLC on the computer screen and navigation through the menus is identical to the TWLC keypad/display. If a land phone line is available, a modem can be connected and the system can be viewed and operated remotely, allowing a knowledgeable service agent to troubleshoot the system anywhere in the world.

FEATURES

- Up to 6 chiller units can be integrated into one network
 - Keypad/Display has a 4-button control and a 4-line backlit LCD display
 - Multiple keypad/displays can be used for remote access
 - Multi-unit panels come with circuit breakers for compressor and pump control
 - Chiller staging based on circulated water temperature
 - Compressor rotation to equalize run time of each unit
 - Compressor and pump time delay to prevent simultaneous starting
 - Records and logs faults and run times
 - Monitors 12 different faults
- Advanced Options:**
- Connect to an on-board computer or modem
 - Current transducers to monitor compressor and pump amperage
 - Seawater temperature sensors
 - Refrigerant pressure transducers
 - Loop water and seawater pressure transducers
 - Control an optional source of heat (electric immersion heater or fuel-fired boiler)
 - Remote unit shutdown for load shedding
 - Fault signal output for remote alarm



# of Units	W (in/mm)	H (in/mm)
2 - 3	22.0/560	24.0/610
4	30.0/760	24.0/610
5	35.0/890	24.0/610

Typical dimensions for standard panels. Options such as transducers, spare pump switches, multiple power inputs, etc. might require the next larger panel size.

Tempered Water Logic Control Dimensions

MULTI - UNIT PANELS

TWLC is available only as part of multi-unit chiller package. The custom panel will include the microprocessor boards, keypad/display, circuit breakers and relays for the compressors and pumps. Wiring from the panel to the chillers is also included. A control power transformer is included on 380-460V panels.

Since each multi-panel is custom built, there are many options available:

- **Spare Pump Switch** – Selector switches can be added for backup (spare) pumps.
- **Multiple Power Inputs** – Up to 3 power blocks can be installed to help divide the chiller and pump loads.
- **Auxiliary Water Heater** – If an auxiliary water heater is desired, the panel can be built with the appropriate breakers and contactors to control the heater.
- **Fault Output Relay** – A set of “dry” contacts can be installed to operate an alarm on the vessel’s monitoring system.
- **Longer Wire Harness** – The standard harness is 10 ft (3m) but longer harnesses are available, up to 30 ft (9m).
- **Frame Mounted Panel** – If a framed chiller is ordered, the panel can be mounted on the frame.
- **Load Shedding** – Terminals can be provided in the panel to allow a load-shedding system to remotely shut down individual chillers.

In addition to the options above, two different upgrade packages are available for multi-unit panels.

The Level 1 upgrade package adds current transducers for the compressors and pumps, seawater out temperature sensors in each chiller, a common seawater inlet temperature sensor, and the computer and modem adapters.

The Level 2 package includes all items in Level 1, plus: high and low refrigerant pressure transducers for each chiller, a seawater pressure transducer (to install on the discharge of the seawater pump) and a loop water pressure transducer (to install on the inlet of the loop water pump).

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